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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/826,056	04/16/2004	M. Saif Islam	200312090-1	9464

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EXAMINER

PHAM, THANHHA S

ART UNIT PAPER NUMBER

2813

DATE MAILED: 05/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/826,056

Applicant(s)

ISLAM ET AL.

Examiner

Thanhha Pham

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 March 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-42 is/are pending in the application.
- 4a) Of the above claim(s) 23-42 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>4-12-04</u> | 6) <input checked="" type="checkbox"/> Other: <u>ATTACHMENT</u> |

DETAILED ACTION

This Office Action is in response to Applicant's Election dated 03/02/2005.

Election/Restrictions

1. Applicant's election of claims 1-25 in the reply filed on 03/02/2005 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).
2. Claims 25-42 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim.

Oath/Declaration

3. Oath/Declaration filed on 04/16/2004 has been considered.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. **Claims 13-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.**

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► With respect to claim 13,

lines 7-11, it is not clear where “the trench spaced from the vertical sidewalls” comes from and is located. Is there any relationship between this “the trench spaced from the vertical sidewalls” (lines 7-8) to the “a trench” (line 4)? it is not clear where “a vertical structure” as cited on line 8 comes from and is located. Is there any relationship between this “a vertical structure” (line 8) to “a plurality of nano-scale spaced apart vertical structure” (line 7)? It is not clear how a side of the vertical structure can face both of a side of an adjacent vertical structure and a trench sidewall? It is not clear where “a trench sidewall” as cited on line 10 comes from and is located. Is there any relationship between this “a trench sidewall” (line 10) to “the trench sidewalls” (lines 5-6)?

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-6, 8-17 and 19-24, as being best understood, are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over being anticipated by Chou et al. [US 2004/0156108]

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*****Notice:** *It is noted that process limitations of details of polished and etching characteristics, depositing and removing materials in claims 1-6, 8-17 and 19-24 does not carry weight in a claim drawn to structure because distinct structure is not necessarily produced. See In re Thorpe, 227 USPQ 964 (Fed. Cir. 1985). In addition, a "product by process" limitation is directed to the product per se, no matter how actually made, in re Hirao, 190 USPQ 15 and 17 (footnote 3). See also In re Brown, 173 USPQ 685 (CCPA 1972); In re Luck, 177 USPQ 523; In re Fessmann, 180 USPQ 324 (CCPA 1974); In re Avery, 186 USPQ 161; In re Wertheim, 191 USPQ 90; and In re Marosi et al., 218 USPQ 289 (Fed. Cir. 1983); all of which made clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product by a new method is not patentable as a product, whether claimed in "product by process" claims or not. "Even though product -by[-] process claims are limited by and defined by the process, determination of patentability is based upon the product itself. The patentability of a product does not depend on its method of production. If the product in product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product is made by a different process." In re Thorpe, 227 USPQ 964, 966 (Fed. Cir. 1985) (citations omitted).*

► With respect to claims 1-2, Chou et al. (figures 13-17's, text paragraphs [0001]-[0099]) discloses the claimed imprinting apparatus comprising:

a semiconductor substrate (NIL mold 20A, fig 13C, text paragraph [0074]) having a (110) horizontal planar surface and vertical sidewalls of a trench, the trench vertical sidewalls are aligned with (111) lattice planes of the semiconductor substrate, the semiconductor substrate comprising a plurality of vertical structures between the trench vertical sidewalls (see attachment for details) and the plurality of vertical structure being spaced apart from each other to form a mold that provides a pattern for imprinting (text paragraph [0072] & [0075]-[0079]).

► With respect to claims 13-14, Chou et al. (figures 13-17's, text paragraphs [0001]-[0099]) discloses the claimed nano-imprinting apparatus comprising:

a semiconductor substrate (NIL mold 20A, fig 13C, text paragraph [0074]) having a horizontal (110) planar surface and a plurality of (111) vertical lattice planes intersecting the (110) planar surface;

sidewalls of a trench (see attachment) in the semiconductor substrate along spaced apart (111) vertical lattice planes such that the trench sidewalls are (111) vertical planes;

a plurality of nano-scale spaced apart vertical structures (see attachment) disposed in the trench, each of the nano-scale spaced apart vertical structures having opposing sides and an end, one of the opposing sides of the nano-scale spaced apart vertical structure facing one of a side of an adjacent vertical structure or the trench sidewall, the end having a horizontal surface coplanar with the (110) planar surface of the semiconductor substrate;

wherein the plurality of the nano-scale spaced apart vertical structures between the trench sidewalls provides a nano-scale pattern for nano-imprinting (text paragraph [0072] & [0075]-[0079]).

- ▶ With respect to claims 3-4 and 15-16, Chou et al (text [0074]) shows the semiconductor substrate is silicon which is a material selected from one of an element from group VI, elements from group III-V and elements from group II-VI.
- ▶ With respect to claims 5-6 and 17, the vertical sidewalls of Chou et al (fig 13c, text [0074]) would be smooth and have reduced structure damage relative to trench sidewalls that are dry chemical etched.
- ▶ With respect to claims 8-9 and 19-21, Chou et al. (fig 13C and text [0074]) shows the vertical structure being formed of vertically extending portions of a second material , the semiconductor substrate is silicon wherein the second material (silicon) being selected from silicon, silicon dioxide, silicon nitride and germanium (***)Notice that

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details about information of the first material does not carry patent weight the claimed structure since the first material is removed from the claimed structure).

► With respect to claims 10 and 22, Chou et al. (fig. 13C) shows the plurality of vertical structure are walls of the semiconductor substrate separating adjacent parallel trenches, the parallel trenches being between the trench vertical sidewalls (see attachment).

► With respect to claims 11 and 23, Chou et al. (fig. 13C and text [0074]) shows the plurality of vertical structures are walls of separating adjacent parallel trenches, the walls being aligned with different ones of (111) vertical planes of the semiconductor substrate.

► With respect to claims 12 and 24, Chou et al. (fig. 15, text [0074] & [0006]) shows the mold pattern has a vertical structure spacing that ranges from about 5 nm to about 100 micron (e.g. 100 nm) or a vertical structure pitch that ranges from about 10 nm to about 200 micron (under 100 nm, e.g. 99 nm). In addition, the claimed ranges of vertical structure spacing and vertical structure pitch are considered to involve routine optimization while has been held to be within the level of ordinary skill in the art since specification fails to show the criticality of the claimed ranges. The claim is prima facie obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. In re Woodruff, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also In re Boesch, 205 USPQ 215 (CCPA 1980) (discovery of optimum value of result effective variable in known process is ordinarily within skill of art) and In re Aller, 105

USPQ 233 (CCPA 1955) (selection of optimum ranges within prior art general conditions is obvious).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 7 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chou et al. [US 2004/0156108] in view of Schaper [US 2003/0219992].

Chou et al substantially discloses the claimed nano-scale imprinting apparatus including using the silicon wafer with the (110) planar surface as a mold element. Chou et al does not expressly teach using said silicon layer as the silicon layer on a silicon-on-insulator wafer.

However, Schaper (text [0064]-[0068]) shows an equivalent of using either the silicon wafer or the silicon layer of the silicon-on-insulator wafer as mold element for imprinting apparatus.

Therefore, at the time of invention, it would have been obvious for those skilled in the art, in view of Schaper, to use the silicon layer with the (110) planar surface of the imprinting apparatus of Chou et al as the silicon layer of the SOI as being claimed for convenient known substrate for mold element of the imprinting apparatus.

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Conclusion

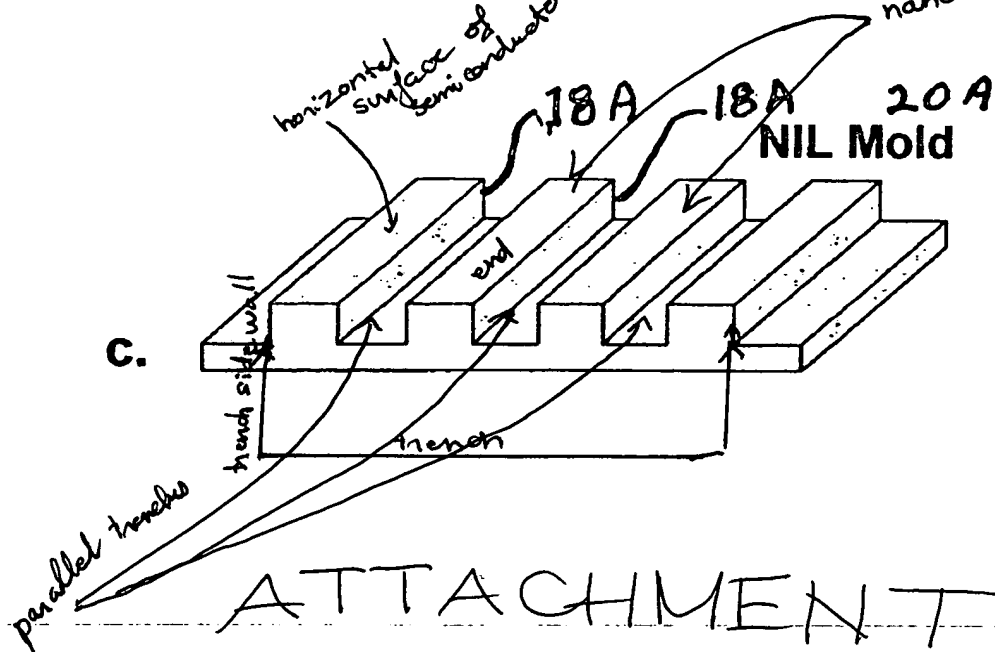
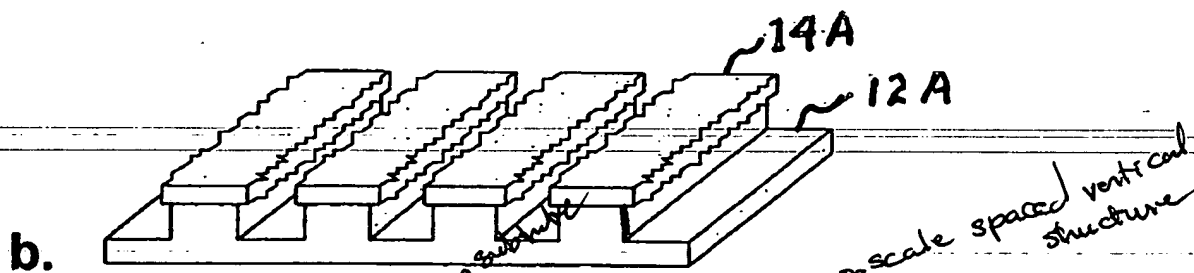
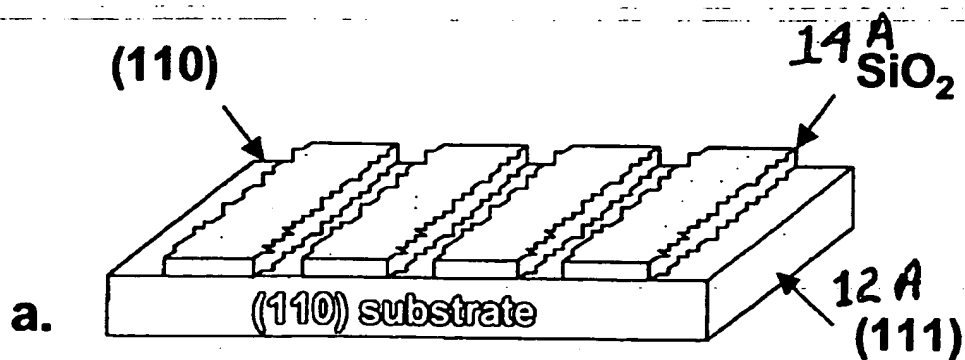
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanhha Pham whose telephone number is (571) 272-1696. The examiner can normally be reached on Monday and Thursday 9:00AM - 9:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Thanhha Pham
Patent Examiner
Patent Examining Group 2800



ATTACHMENT

Fig. 13